

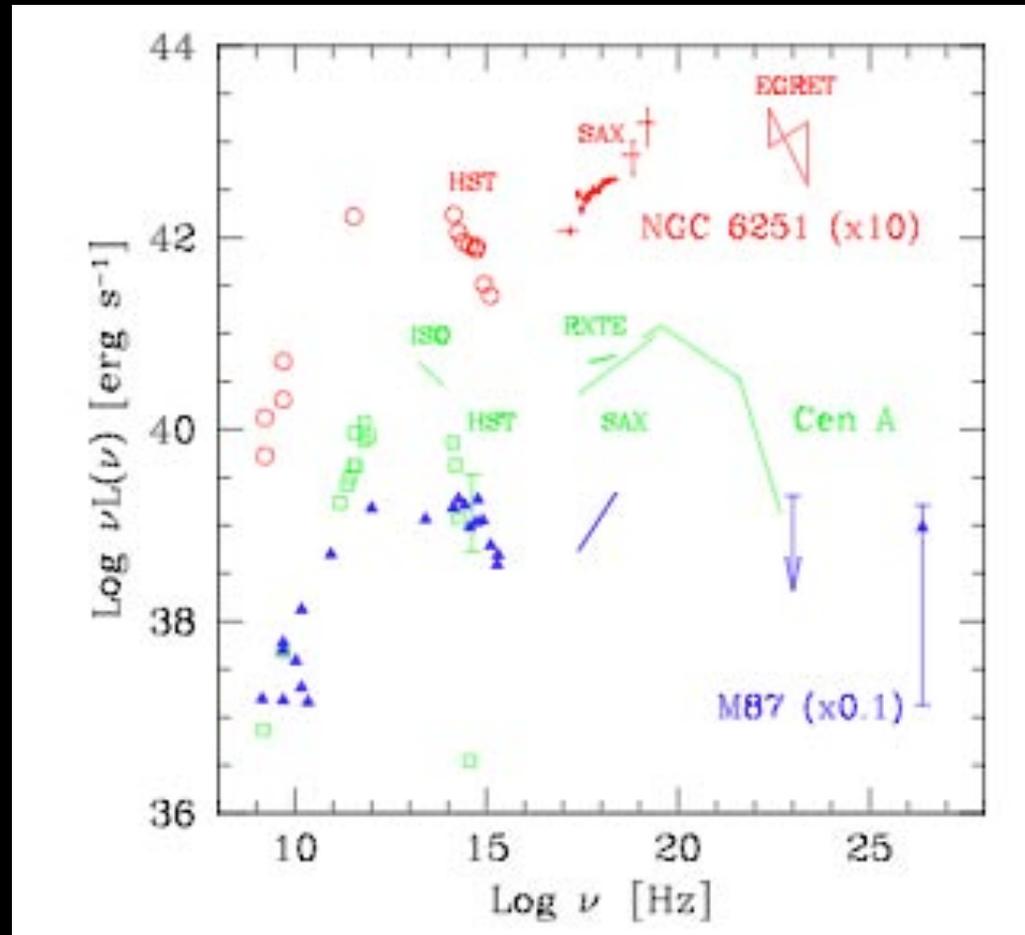
# A question

Can GLAST detect "other" AGN?

# The case of Radio Galaxies (FRIs)

- Two already detected with EGRET: Centaurus A and NGC 6251
- TeV detection of M87
- Variability: gamma from core

A continuous population with blazars?



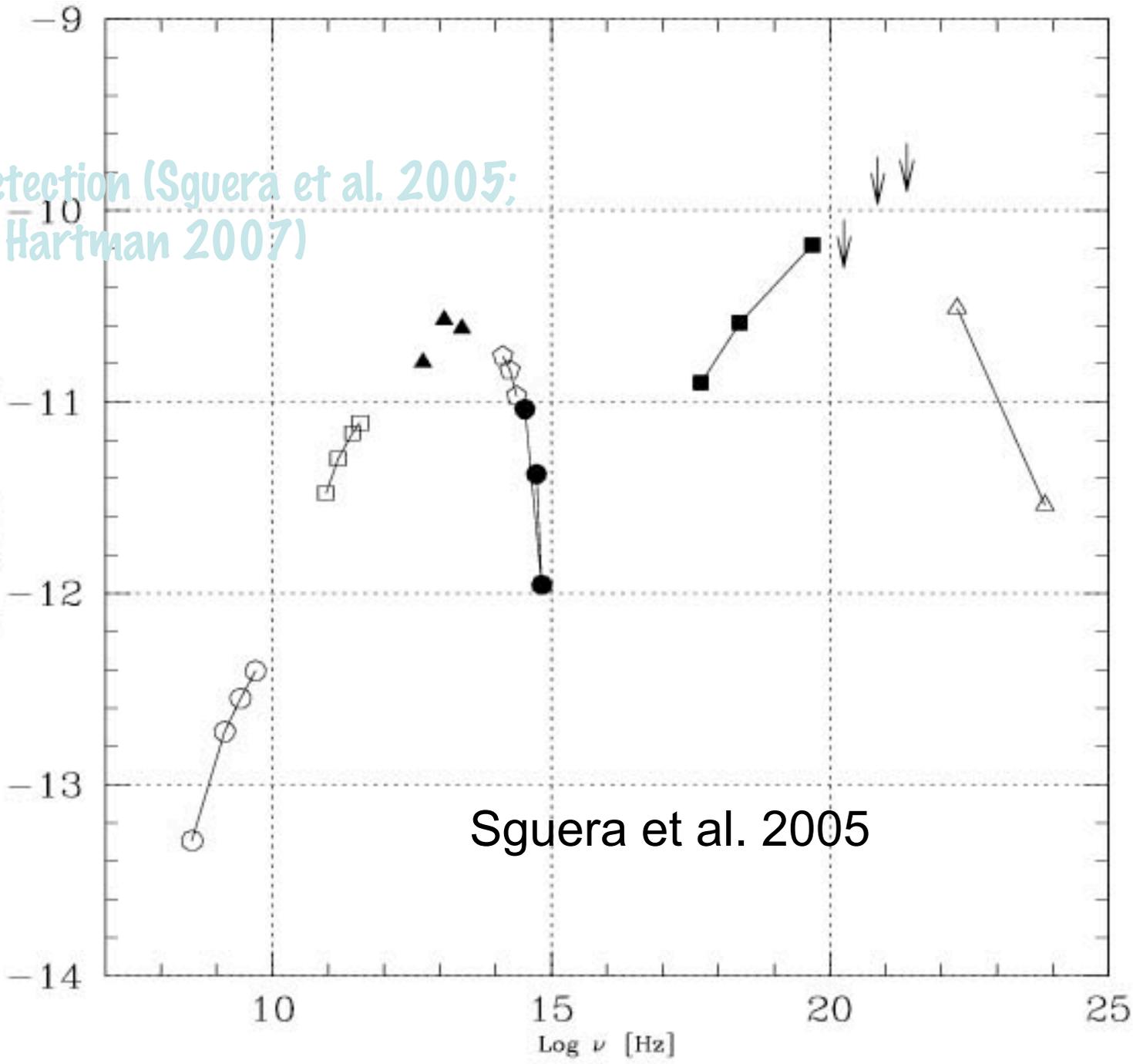
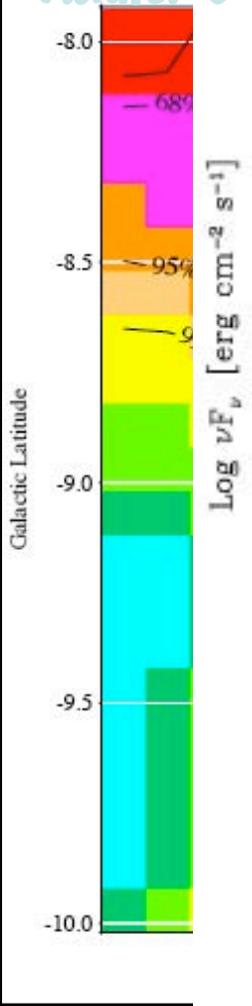
# Theoretical Expectations

Ghisellini, Tavecchio, & Chiaberge 2004:

- Assume a structured jet: fast spine+slow layer
- Predict GeV from 20 FRIs,  $> 10^{-12}$  erg/cm<sup>2</sup>/s
- LAT detection (TS=25) in 6-18 months

(also, decelerated jets: Georganopolous & Kazanas 2003)

EGRET detection (Sguera et al. 2005;  
Kadler & Hartman 2007)



Sguera et al. 2005



al



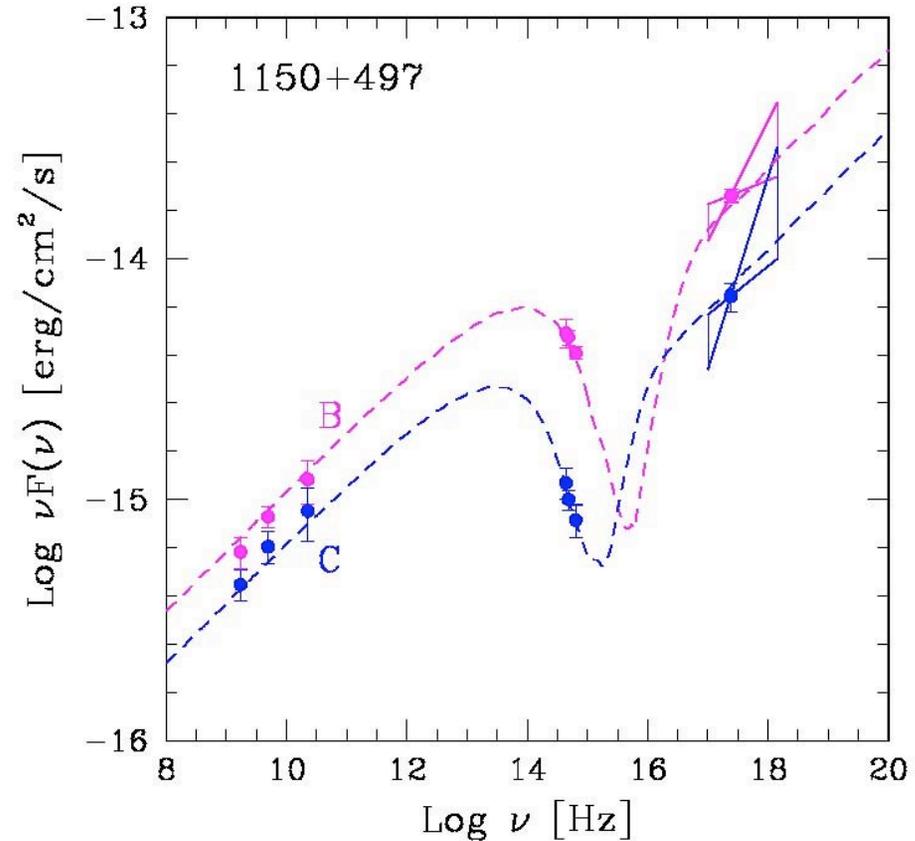
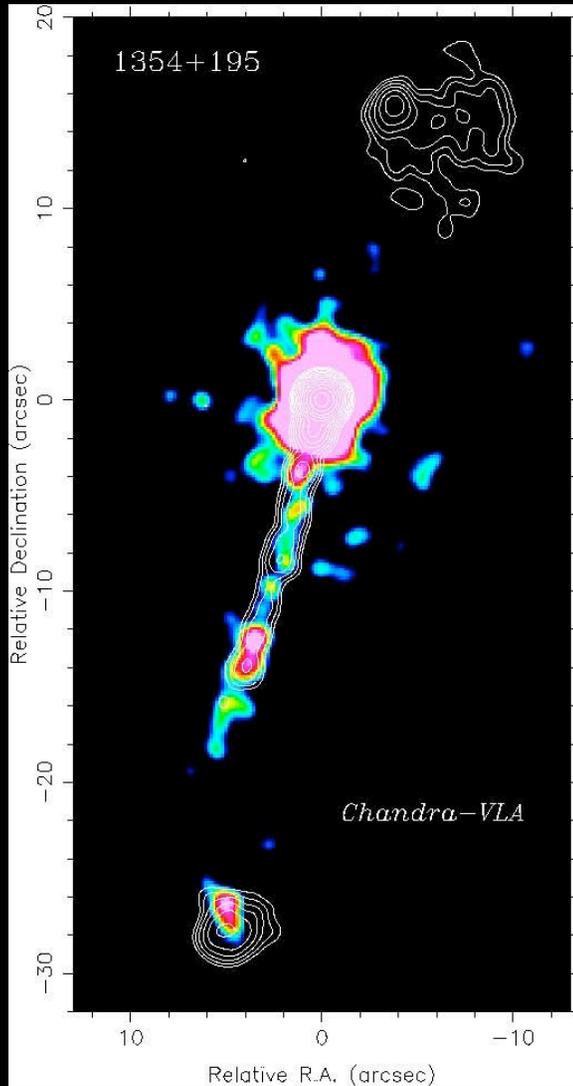
Can LAT detect g-rays from the  
extended features of radio  
galaxies?

**Rita Sambruna**

**NASA's GSFC**

**With: D.Davis, A.Cillis, M.Georganopolous, D.Kazanas**

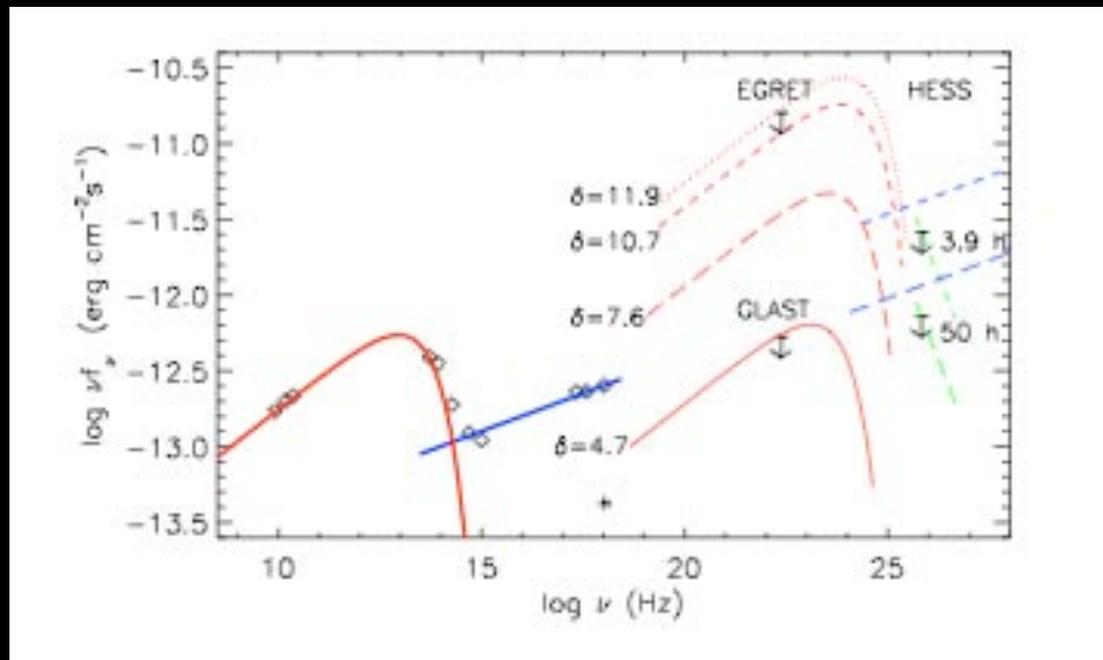
# Chandra Jets in powerful quasars



RMS et al 2002, 2006

# Feasibility

- Main issue: Core is a powerful blazar!
- Need: weak/low-state core and/or variability
- GeV flux is AT LEAST an upper limit to jet and constrains beaming factor (Georganopolous et al. 2006)



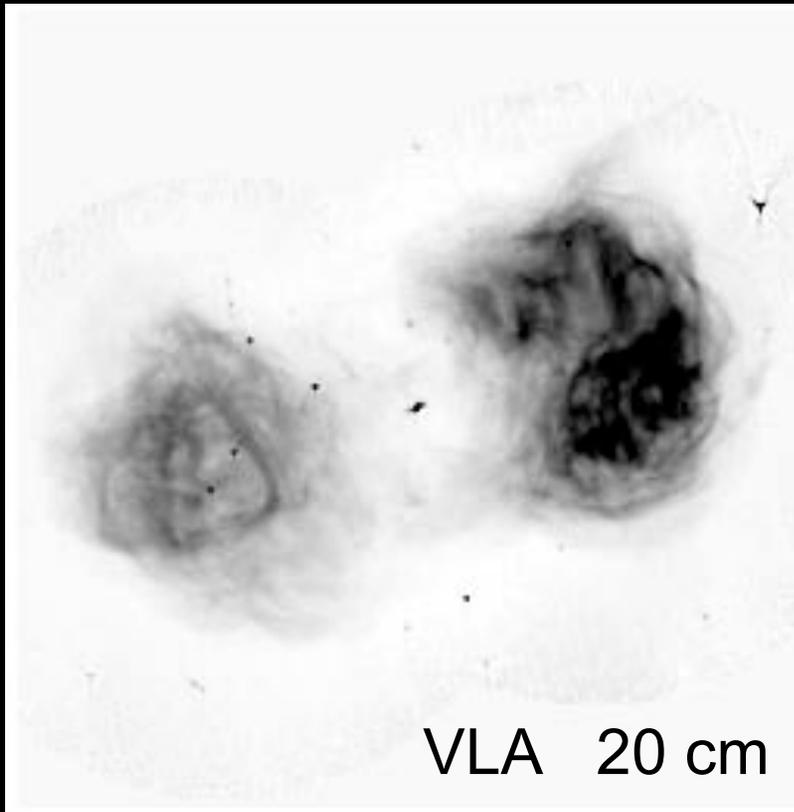
**What about the radio lobes?**

# Optimal Candidates

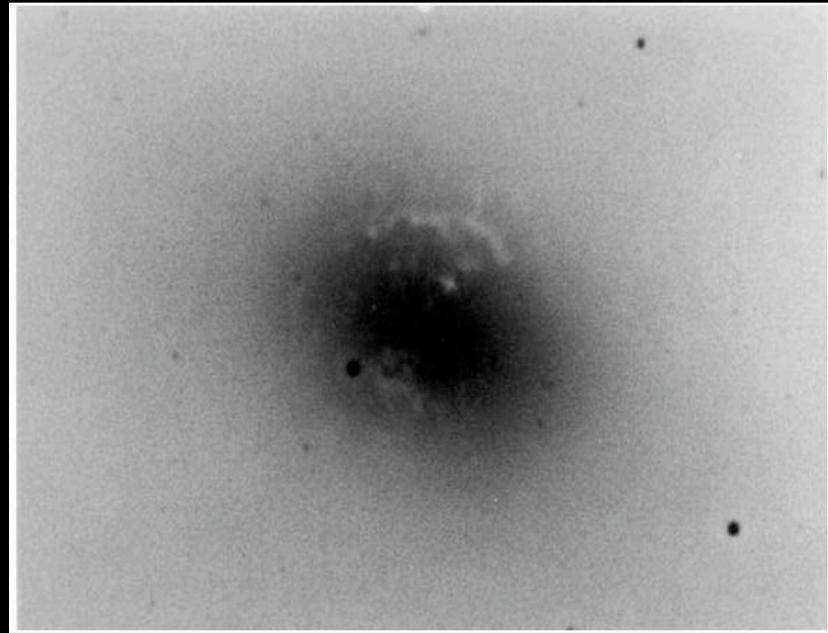
- Large angular size ( $>30$  arcmin)
- High Galactic latitudes
- Weak core
- Possibly X-ray emitters
  
- Known radio spectrum

# Fornax A

- Giant FRI at  $D=18$  Mpc
- Core is a LINER
- Radio Lobe separation: 33 arcmin

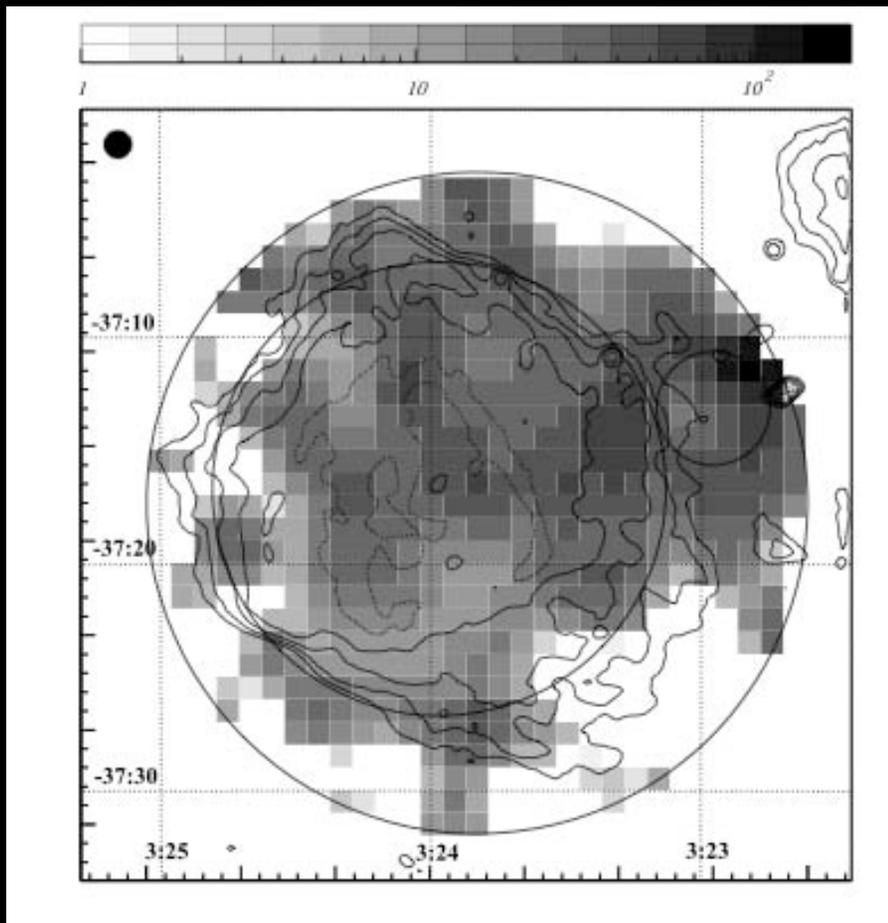


VLA 20 cm



Palomar

# X-ray emission from the lobes of Fornax A



Eastern Lobe:

XMM EPIC  
0.5-10 keV

Isobe et al 2006

- X-ray emission from the East lobe of Fornax A: IC off the CMB (Feigelson et al. 1995)

- Electron energy and magnetic field constrained:

$$B = 1.2 \text{ microGauss}$$

$$\gamma = 10^3$$

- $\alpha_{\text{radio}} \approx \alpha_X \approx 0.6$

Isobe et al. 2006

# Gamma-rays from the East lobe of Fornax A?

- IF electron distribution continues unbroken to  $\gamma = 10^6$

$$F = 1.5 \times 10^{-8} \text{ ph/cm}^2/\text{s} \text{ in } 100 \text{ MeV}-1 \text{ GeV}$$

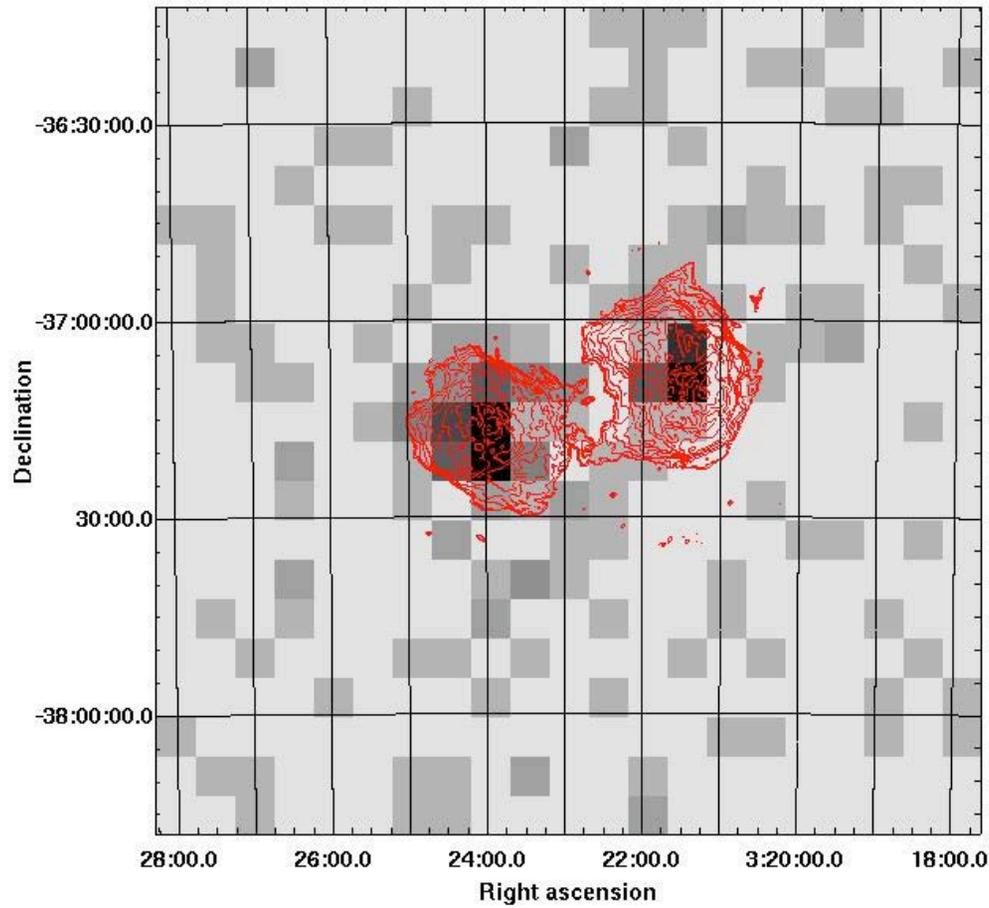
# Indeed!

- Analysis of the EGRET data provided a 2.2sigma detection of Fornax A:

$4 \times 10^{-8}$  ph/cm<sup>2</sup>/s at  $> 100$  MeV

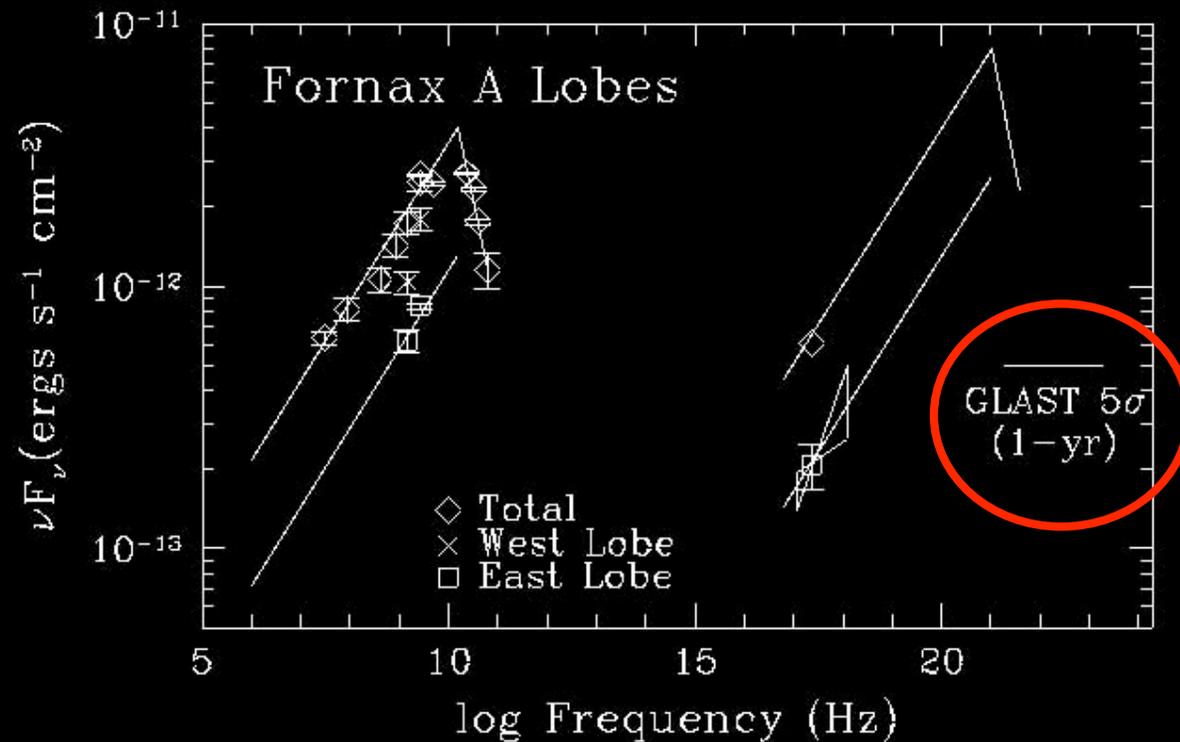
Cillis, Hartman, & Bertsch 2004

# A LAT simulation



# The devil is in the details

- WMAP: cutoff in the radio spectrum at 10 GHz!



Cheung 2006, astroph/0612372

# In progress:

- What is the origin of the GeV flux from Fornax A?
  - IC/CMB in the lobes
  - Scattering of galaxy's optical photons?
  - Core contribution?
  - Binaries?
- Other candidates: Cen A, Pic A, ...

# Conclusion

GLAST and radio galaxies:  
so much more than “just” the core